

**Summary Technical Report Number 1 – Systematic review and practice recommendations for use of spaced-retrieval training with individuals with dementia.**

Academy of Neurologic Communication Disorders and Sciences

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## Background

In 2001 the Academy of Neurologic Communication Disorders and Sciences (ANCDS) formed a committee to develop practice guidelines for individuals with Alzheimer's dementia (AD). In the 1990s practice guidelines proliferated in medicine and allied health fields. Clinical practice guidelines form a basis for improving knowledge, changing attitudes about standards of care, shifting practice patterns, and enhancing patient outcomes (Lohr, Eleazer, Mausekopf, 1998). Their credibility depends on the strength of the science and expert opinions on which they are based. Although the system for developing guidelines, endorsed by ANCDS, was designed to insure the validity and usefulness of practice guidelines, in so far as possible, committees who accept the charge of developing practice guidelines influence their development. Thus, information about committee composition is germane for judging their recommendations. Committee members authoring this report vary in background and discipline, a recognized strength for insuring a thoughtful product. Some are research scientists and professors with degrees in speech and hearing sciences, cognitive psychology, or clinical psychology, others are clinicians who have practiced in hospitals and long-term care facilities with AD patients, and another member was an administrator for a large long-term care provider. The decisions made by committee members require knowledge of research principles and data analysis and one committee member is an expert in research design and measurement with prior experience developing practice guidelines in medicine.

The process of development of guidelines endorsed by the ANCDS oversight committee includes the following:

- Forming a committee of experts from multiple disciplines who have had a variety of experiences
- Identifying the clinical questions faced by speech-language pathologists
- Conducting an exhaustive literature search for information related to the clinical questions
- Reviewing research reports as to their internal validity, external validity, dose-response data, and construct validity
- Soliciting expert opinion
- Drafting recommendations for clinical practice
- Having peers review proposed practice recommendations
- Modifying recommendations if appropriate
- Distributing recommendations

The first major decision of committee members was to limit consideration to the management of individuals with AD and related degenerative dementias. Committee members then identified what they believe to be the crucial questions that clinicians have about managing individuals with these dementias. The literature searches relevant to these questions have been completed and the compiled evidence has been reviewed. In this summary technical report, evidence related to spaced-retrieval training for individuals with dementia is reviewed. Other reports will follow. For more information

on the development of the dementia practice recommendations, please see Bayles et al. (2005). Also refer to the Project Introduction document by Golper et al. on the ANCDs website for more information on the general project.

## **Procedures**

### **The searches: Spaced-retrieval training**

An exhaustive search of the literature was conducted by searching the following electronic databases: Medline (1966-August 2002), CINAHL (1982-August 2002), HealthSTAR (1975-August 2002), PsychINFO (1967-August 2002), EBM Reviews, Cochrane Database of Systematic Reviews, ACP Journal Club, Database of Abstracts of Reviews of Effectiveness, Cochrane Controlled Trials Register, AMED (1985-September 2002), Academic Search Elite (1980-September 2002). Additionally, hand searches were conducted of relevant edited books and studies cited in articles and chapters. The following search terms were used: spaced-retrieval training; spaced-retrieval; dementia; dementia of the Alzheimer's type, and Alzheimer's/Alzheimer disease. Eighteen articles were identified as being related to the search terms. After excluding studies in which participants were not individuals with AD or a related dementia, and those in which the investigators used cognitive stimulation other than spaced-retrieval training, 13 articles (with a total of 15 studies) were selected for this review (two of the articles contained two studies, see Bird & Kinsella, 1996, and Camp, Foss, Stevens & O'Hanlon, 1996). See the attached evidence table for a summary of the data related to spaced-retrieval training.

## **Ratings**

Subgroups of committee members were formed to review information related to each of the clinical questions. All sources were independently reviewed by at least two committee members according to previously established markers of internal validity, external validity, dose-response data, and construct validity. Both reviewers constructed an evidence table summarizing their interpretations of the internal and external validity, dose-response data and construct validity of the study. Later, comparison was made of the degree of agreement between the reviewers as to the quality of the study. If there was disagreement in their perceptions, the source was reviewed again by another committee member and at times the entire committee to insure accurate representation of the contents of the study. In some cases, the authors of the study were contacted for clarification.

### **Strength of Evidence**

The strength of evidence in each source was rated according to internal, external, and construct validity and dose-response information. Making these judgments required scrutinizing descriptions of subject characteristics, treatments, study controls, outcome measures, and results. Record was made of the presence or absence of the following information related to the aforementioned constructs:

**Internal Validity:** Strength of causal inference

- Type of research design
  - Number of treatments
  - Single subject, series of subjects, or group
  - Number of groups
  - Recipients of treatment (AD patients or caregivers)
  - Presence of control group
- Presence of randomization
- Presence of missing data
- Treatment of missing data

**External Validity:** Generalizability of findings

- Sufficient information for replication (Yes/No)
- Treatment fidelity
  - 0 = Little or no information about the treatment
  - 1 = Some effort to insure all subjects received the same treatment but no manipulation check
  - 2 = Evidence of effort to insure that all subjects received the same treatment and one or more manipulation checks
  - 3 = Well explained treatment and a manual or treatment guide, plus one or more manipulation checks
- Comprehensiveness of subject descriptions: age, gender, diagnosis, severity, vision, hearing, co-morbidities, depression, and residence
- Sample generalizability (Yes/No)
- Causal relation between treatment and outcome
  - 0 = Presence of one or more clear confounding variables (e.g., individuals with different etiologies in sample)
  - 1 = Possible confounding variable
  - 2 = No confounding variables

**Dose-response:** Treatment strength, frequency, duration

- Amount of treatment (Number of minutes given)
- Frequency of treatment (Number of times per day and week)
- Duration of Treatment (Number of days or weeks)

**Construct Validity:** Appropriateness of outcome measures

- Outcome measures were specified
- Quality of outcome measures (0 – 1)
  - 0 = Outcome measure was unstandardized and/or lacked face-validity for measuring treatment effect
  - 1 = Outcome measure was standardized measure with face-validity for measuring treatment effect
- Existence of pretest
- Existence of midway testing
- Existence of post-testing
- Follow-up testing

This information about each source was used to judge the class of evidence. Class I evidence comprised well-designed, randomized controlled clinical trials. Class II evidence comprised observational clinical studies with control subjects. Class III evidence comprised case reports, case series studies, and expert opinion (Miller et al., 1999).

### **Efficacy or Effectiveness Study**

Judgment was made about whether each study was an efficacy or effectiveness study, according to the guidelines of the Office of Technology Assessment (1978). Specifically, in an efficacy study, the investigator is assessing the probability of benefit to individuals in a defined population under *ideal* conditions of use. In an effectiveness study, the investigation concerns the probability of benefit to individuals in a defined population under *average* conditions of use, that is ordinary, everyday circumstances.

### **Phase of Research**

A five-phase model has become widely accepted for characterizing clinical outcome research (Greenwald & Cullen, 1984; Cullen, 1986; Robey & Schultz, 1998). The recognized objective associated with Phase I is to develop a research hypothesis for later testing; the objective of Phase II is refining the hypothesis and methodology for conducting a Phase III study; Phase III research involves testing the efficacy of a treatment under ideal conditions, typically in a randomized controlled trial in which patients who meet selection criteria are randomly assigned to treatment or no-treatment groups; the objective of Phase IV involves extending results of an efficacy study that had positive results to a specified subpopulation; Phase V also extends effectiveness research and includes investigation of such issues as cost-effectiveness, efficiency, etc. of the treatment. Each study was evaluated as to what phase of research it characterized.

### **Terminology**

Over the last two decades speech-language pathologists have debated over the appropriate term to use for the communication disorders experienced by individuals with AD. Some professionals favored using the term "aphasia"; however this term has not gained wide acceptance, perhaps because it is so strongly associated with focal damage to the language dominant hemisphere. Individuals with AD have diffuse damage involving both hemispheres and their communication deficits are attributable primarily to associated memory problems rather than damage to the language centers of the brain. Hence the term "cognitive-linguistic disorder" has become popular because it implies a deficit in cognition as the underlying source of the communication problem. The committee members have chosen to use the term cognitive-linguistic disorder, rather than aphasia, to describe the communication problems experienced by individuals with AD. There appears to be a lack of understanding by many individuals, particularly those in other disciplines and the lay community, of the fact that normal communicative functioning depends on normal memory and cognition. By definition dementia is

impairment in multiple cognitive functions sufficient to interfere with occupational or social functioning.

## **Diversity**

Committee members were interested in the degree to which investigators considered the effects of culture on results of studies and how they controlled for ethnicity. Therefore, record was made of whether diversity issues were considered in subject selection and design. This information is contained in the evidence tables accompanying this report. Inspection will reveal that ethnicity and cultural issues received little attention in subject selection, design of treatments, or in judging treatment effects.

## **Results of the Review**

### **Focus of Studies**

The primary purpose of the 15 research studies was the same: to investigate the effects of SR training on the functioning of people with dementia. However, the studies varied with regard to the associations trained using the SR method. Generally, associations trained using the SR paradigm could be classified into two types: cue-behavior associations and face/object-name associations. Bird (2001) and Bird, Alexopoulos, and Adamowicz (1995) selected cue-behavior associations to teach positive alternatives to problem behaviors demonstrated by participants with dementia. Camp, Foss, Stevens and O'Hanlon (1996; Study 2), and Stevens, O'Hanlon, and Camp (1993) taught cue-behavior associations to individuals with dementia to increase use of external memory aids (i.e., specifically designed calendars). McKitrick, Camp, and Black (1992), Camp et al. (1996, Study 1) and Bird and Kinsella (1996; Studies 1 & 2) used SRT to teach cue-behavior associations centered on experimental tasks involving performance of an action (e.g., putting glasses in a case; handing the experimenter a colored coupon). Face-name associations were taught by Vanhelle, Van der Linden, Belleville, and Gilbert (1998) and Camp (1989). Object-name associations were chosen for training by Cherry and Simmons-D'Gerolamo (1999), Cherry, Simmons, and Camp (1999), Abrahams and Camp (1993), and McKitrick and Camp (1993). Brush and Camp (1998) incorporated face-name associations, a piece of important information, and a compensatory strategy for each participant in their study.

### **Subject Characteristics**

In each of the two studies conducted by Bird and Kinsella (1996), 24 individuals with AD or vascular dementia participated. (Of the 24 participants in the second study, 5 had participated in the first study.) Camp et al. (1996) included 30 participants in Study 1 and 23 participants in Study 2 (calendar training study). The remainder of the reviewed studies had small numbers of participants, ranging from one to seven. In four studies (Abrahams & Camp, 1993; Bird, 2001; Bird et al., 1995; Brush & Camp, 1998), investigators reported single-subject results for individuals with dementia in conjunction

with reports on individuals with other diagnoses (e.g., CVA). In these cases, only the results for the individuals with AD or a related dementia were reviewed and entered into the evidence table.

### **Candidacy**

Information about the age and diagnosis of the participants was provided in all studies and gender was described in 11/15 studies. No investigators reported evaluation of hearing and only one study involved screening of vision of the participants. Five studies included information about depression. Only two of the studies contained information about ethnicity of the participants (Abrahams & Camp, 1993; Vanhalle, Van der Linden, Belleville & Gilbert, 1998).

### **Internal Validity**

Eleven studies were single-subject experiments or case studies, and four were group studies. Cherry and Simmons-D'Gerolamo (1999), Cherry et al. (1999) and McKittrick et al. (1992) used a single-subject design with replications across participants. Investigators in the remaining articles used designs best characterized as case reports either in isolation (Abrahams & Camp, 1993; Bird, 2001; McKittrick & Camp, 1993; Stevens et al., 1993; Vanhalle et al., 1998) or in series (Bird et al., 1995; Brush & Camp, 1998; Camp, 1989). Bird and Kinsella (1996, Studies 1 & 2) employed a single group, pre-post test design in their two investigations, and Camp et al. (1996, Studies 1 & 2) used a single group design as well. No study involved random assignment of subjects to groups and reliability of data collection procedures was not mentioned in any studies.

### **External Validity**

Spaced-retrieval training is a standardized procedure in which individuals are asked to recall information over increasing intervals of time. Variations can exist, however, in factors such as the length of the recall intervals, the nature of the activities conducted during the recall intervals, the number of recalls in each treatment session, length of treatment sessions, stimulus items used in training and so forth. The majority of the studies contained information on several of these parameters, and 11 of the studies were judged to have sufficient information to allow a naïve reviewer to replicate the treatment. Manipulation checks, important for determining treatment fidelity, were only reported in two of the 15 studies reviewed. Treatment fidelity was rated by the reviewers as 1 or 2 (moderate to good) on a scale from 0-3.

Sample generalizability was variable among the studies, as a result of differing inclusionary and exclusionary criteria for subject selection and mixed dementia types. For example, in Cherry et al. (1999) and Cherry and Simmons-D'Gerolamo (1999), participants were carefully selected to meet strict inclusionary criteria. Thus, these individuals may be a select subgroup that is not representative of the general population of individuals with AD. Causal generalizability was judged to be moderate (a rating of 1 on a 0-2 point scale) among the majority (n=9) of the 15 studies.

## **Construct Validity**

The outcome measures used in all studies included the following: number of cues needed to recall trained information, frequency of target behavior, and verbal production of target response after a predetermined interval of time (e.g., 24 hours, one week, two weeks). Other measures were used to characterize the sample or to determine the relationship of the measured construct to performance on the treatment tasks, but these data were not used for outcome measurement.

## **Dose-Response**

In three of the studies (Bird, 2001; Bird & Kinsella, 1996, Studies 1&2), no information was provided on the frequency, duration, or total number of treatment sessions. Session length in the other 12 studies ranged from 30-90 minutes, one to three times a week for up to 12 weeks for a total maximum of 12 treatment sessions.

## **Summary of Findings**

The results of the studies reviewed for this report were generally positive. All of the subjects who participated in the 15 studies learned some or all of the target information and behaviors being taught. In the Bird (2001) case study, the participant learned a compensatory behavior to replace an existing negative one. Bird and colleagues (1995) also reported that the one of the two individuals in their case studies learned the association between a cue and behavior to reduce disruptive vocalizations and Stevens et al. (1993) and Camp et al. (1996, Study 2) reported that participants learned to use a calendar as an external memory aid in less than three weeks. In the Cherry et al. (1999) and Cherry and Simmons-D'Gerolamo (1999) studies, all subjects learned and some retained the trained object-name associations. Abrahams and Camp (1993) and McKitrick and Camp (1993) also reported positive results of object-name SR training. Camp (1989) reported that individuals acquired trained face-name associations in fewer than five sessions and retained them for varying intervals of time. Vanhalle et al. (1998) showed that the individual in their case study learned face-name associations, though one type of instruction proved to be superior to another. Many of the participants in the Bird and Kinsella studies (1996) learned the cue-behavior associations. McKitrick et al. (1992) reported that their subjects learned to correctly perform the task of handing the experimenter a colored coupon in five or fewer sessions and Camp et al. (1996, Study 1) had 22/30 participants select a coupon and give it to the examiner after a one-week delay. Results from Brush and Camp (1998) were variable, with all participants learning some information, but with two participants not completing the study. Importantly, in many of the studies, individuals not only learned but retained the associations and in some cases, demonstrated generalization of learning across contexts and stimuli.

## **Conclusions**



SR training is a cognitive-linguistic intervention that has the potential to be of great utility to speech-language pathologists as they work to improve the function of individuals with dementia. Although the results of the reviewed studies were overwhelmingly positive, many questions related to SR training remain unanswered. One of the most important questions is related to the generalization of learned associations to the situations in which they should be used by patients and the length of time these associations are used before additional “booster” training sessions are needed. Also of interest are the factors that affect response to SR training. For example, patient characteristics, including dementia severity and type, information practiced during recall intervals, and modifications of the protocol (e.g., length and number of intervals, recall versus recognition, inclusion of other approaches) may affect learning, retention and generalization.

Methodological shortcomings of the reviewed studies warrant cautious interpretation of the findings. The absence of reports of inter-rater reliability was surprising. The accuracy of dependent measures based solely on behavioral observations depends entirely on the degree to which the behaviors are noticeable to independent observers. More attention must be paid to including these reliability judgments in the research examining the efficacy and effectiveness of SR training.

In summary, promising data are available to support the use of SR training with individuals who have AD or a related dementia. However, more data are needed to judge the efficacy and effectiveness of SR training with this population.

### **Future Research Directions**

Additional studies with larger samples and experimental control are needed to investigate the following:

- The efficacy of SR training
- The effectiveness of SR training
- The effect of patient characteristics on response to SR training
- The type of information that can best be trained in the SR format
- The optimal number of recall intervals to learn information and behaviors
- The optimal frequency and duration of the treatment sessions
- Who can be trained to carry out SR training and the results of these interventions
- The generalization of the learned responses/behaviors to the necessary contexts
- The perspectives of caregivers and patients regarding SR training
- The influence of type of response required by the patient (i.e., recall or recognition) on learning within the SR paradigm
- The use of SR training in conjunction with other interventions
- The cost effectiveness of various types of SR training

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